FAIRFIELD COUNTY STREAM MANAGEMENT GUIDE

Sycamore Creek

INTRODUCTION

The Fairfield Soil and Water Conservation District (SWCD) has assembled this stream management guide to assist interested landowners in protecting their stream banks and corridors against erosion and degradation.

Streams are ever moving. Natural stream channel stability is achieved by allowing the stream to develop a stable dimension, pattern and profile such that over time, channel features are maintained and the stream system neither aggrades or degrades.

Unfortunately, human activities that modify upstream land use often put the stream ecosystem out of balance and we must use either hard or soft engineering practices to protect the bank and value of our property.

This book will showcase several common stream bank stabilization methods. The detailed drawings are examples and are not specifically sized for any specific site. Any property easements, deed restrictions and zoning regulations should also be investigated prior to any construction. The Ohio Department of Natural Resources has detailed fact sheets on many of these options and that can be accessed at:
http://water.ohiodnr.gov/water-conservation/stream-restoration#PUB

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Eroding vs. Stable Banks

Characteristics	Eroding Bank	Stable Bank
Bank Slope	Often vertical or close to vertical, mass of sod or failed material at toe	Not vertical, may have vegetated berm at toe
Bank Cover	Absence of vegetation	Variety of vegetation on slope
Bank line	Irregular	Relatively uniform or smoothly curving
Sediment	Streambed covered with sediment, sand/stone bars not stabilized	Sediment located in bars which may be partially stabilized with vegetation
Trees	Inside the bank line, leaning toward channel, fallen and obstructing streamflow	Often has trees growing on bank or on toe bed

Unstable Banks

Pleasant Run and Clear Creek

Stable Bank

Scippo Creek

TYPES OF STABLIZATION METHODS

Hard Stabilization

These methods are going to use hard materials such as stone, metal, concrete and engineered materials. Hard options are expensive and typically take large equipment to install. They are very durable if designed and installed correctly.

Examples include:

- Stone toe/bank rock
- Gabion baskets
- Bendway weirs
- Pilings
- Lined channels
- Retaining walls

Please note that broken up or slabs of old concrete is not a good option. The density of concrete is less than water and will float. There are also regulations regarding concrete being placed in a stream.

Please note that any retaining wall requires adequate drainage to allow for soil pressure.

Railroad ties can contain toxic chemicals (depends on the type of treatment) and should be used with caution.

Soft (Green) Stabilization

These methods are going to use more green materials such as trees and provide a natural appearance. Soft options are typically less expensive than hard options, however they can be labor intense depending on the type you choose. Failure rate tends to be higher since the material used isn't as sturdy and can deteriorate over time.

Examples include:

- Evergreen revetments
- Tree kickers
- Live crib walls

TOE ROCK

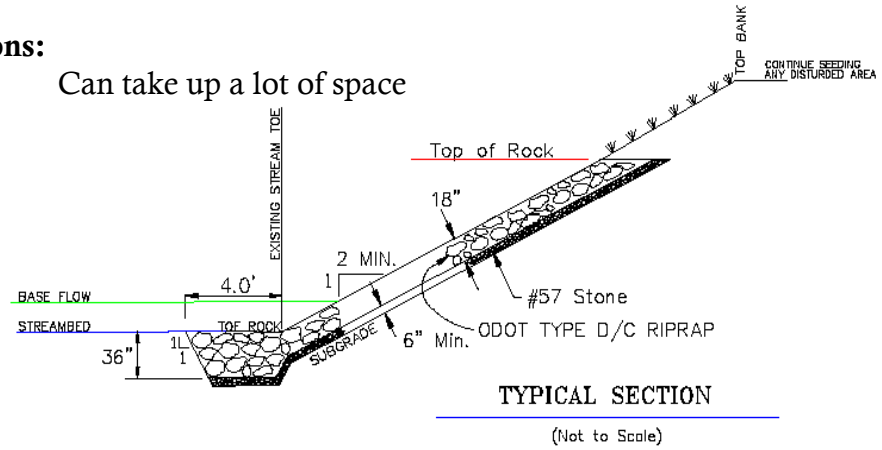
The toe is the break in slope at the foot of a stream bank where the bank meets the bed. Toe Rock is probably the most practical option for most landowners. It does require that stream banks are graded to a stable slope (2:1 for most Fairfield County soils), so it can take up some land depending on the height of the bank. Water tolerant vegetation is recommended above stone. The size of rock is going to depend on the velocity in the stream, usually an ODOT Type D (3"-12" with 50% over 6") or C (6"-18" with 50% over 12") riprap is required. When placed properly, most of the rock is going to be entrenched into the bank and streambed and is not visible. Dumping rock over the bank is not a good method for long term stability.

Pros:

More affordable option than other hard materials
Barely noticeable over time
Low failure rate

Cons:

Can take up a lot of space



TYPICAL SECTION

(Not to Scale)

Toe Rock with mature red twig dogwoods on stream bank above stone. Dogwoods can be trimmed for a more manicured look.

Fetters Run

TOE ROCK continued

Problem: We have tall sheer bank on a sizable stream that is very entrenched. This stream is experiencing considerable degradation and landowner is losing a lot of land.

Solution: Stone size adequate for stream velocity is placed at toe and extends to height of low bank on other side of stream. Water tolerate grass is planted on remainder of bank slope and beyond to act as a field buffer.

Notice how high water now flows toward the center of the stream instead of impacting the bank.

Walnut Creek

Problem: We have a stream bank that is eroding and encroaching upon valuable infrastructure: road, bike path and sports facility. This stream has experienced upstream development that is very flashy (a lot of water comes quickly when it rains).

Solution: Stone size adequate for stream velocity is placed at toe and bank. Grass and native fascines (bundled dogwood cuttings) are planted in bank.

Notice that the low bank is much lower in this example as opposed to the previous page and a lot less stone is needed.

Several years out from construction, vegetation is starting to take hold and stone is less visible providing a more natural appearance.

GABION BASKETS

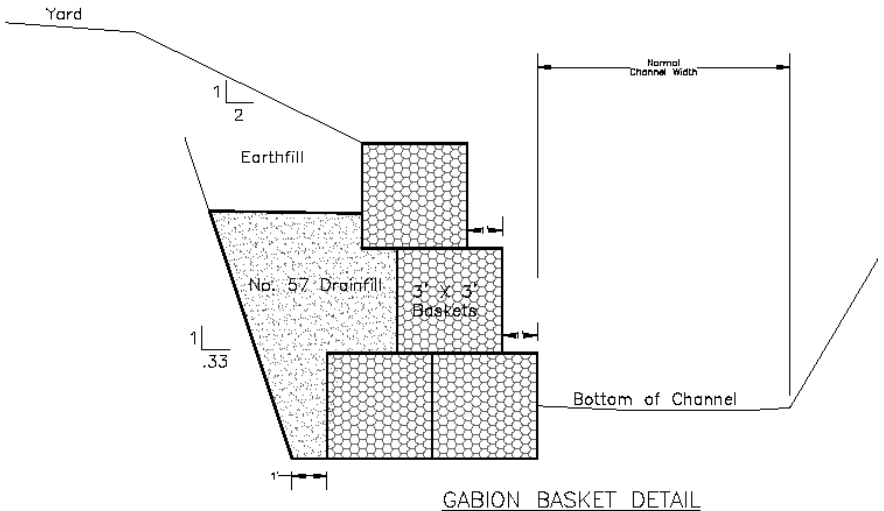
Gabions can be an alternative option to the traditional sheet pilings where you have fairly vertical banks. Depending on the space available, they work well in combination with sloped back banks. Local stone quarries sell a gabion gradation of limestone that place well in the baskets.

Pros:

Visually appealing
Good for areas with limited space

Cons:

Expensive
Labor intensive
Baskets can settle and collapse if not placed properly
Engineering required



GABION BASKET DETAIL
THREE BASKET HIGH
Not to Scale

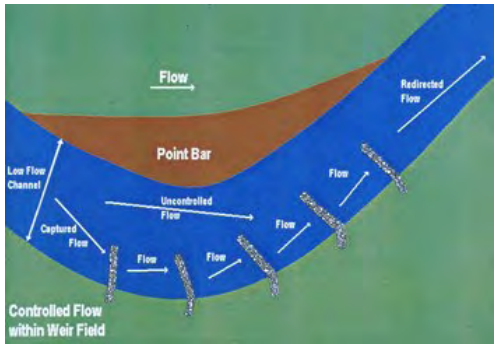
Above: 3 basket gabion wall with sloped and vegetated bank (before and after site)

Below: 4 basket gabion wall along a road

Sycamore Creek

BENDWAY WEIRS

Bendway weirs control stream bank erosion by directing water away from the outer bank of the stream and toward the point bar or center of stream. Weir stone will extend above normal water level, but water will flow over weirs during high water events. Since weirs are installed in series and angled at 15 to 20 degrees upstream, this works best on streams without tight turns. It is normal for sediment to collect on the downstream side of weir near the base. Deep pools tend to develop at end of weir as well.



Pros:

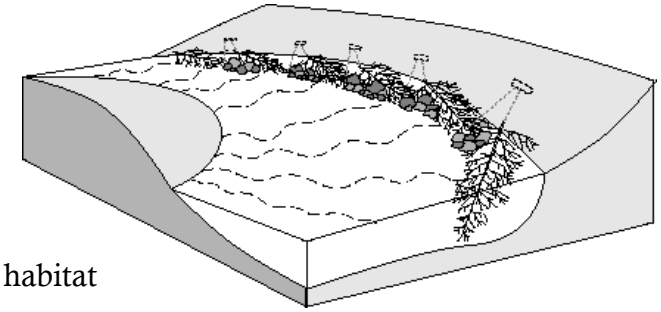
Good for high flows
Create stream habitat
Less bank disturbance

Cons:

No tight bends in stream
Better for larger streams
Can be costly
Detail during construction is critical

EVERGREEN REVETMENTS

Evergreen revetments consist of a wall made from fresh cut cedars or recycled Christmas trees which are anchored into the stream bank. Trees absorb energy from the stream protecting the bank. More permanent vegetation should be established on the bank, as the trees will eventually decay. Trees should be dense limbed; the longer the better.

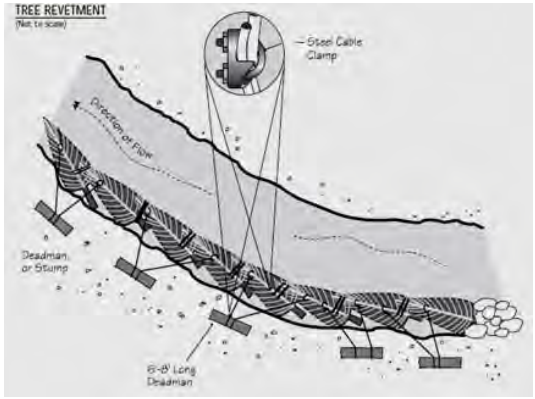


Pros:

Economical
Create stream habitat

Cons:

Not good for high velocity streams
Trees deteriorate over time
Can be labor intensive



TREE KICKERS

Like the evergreen revetments you are using a tree against the stream bank except now the tree is going to act as flow deflector as opposed to a stream bank buffer. The anchoring method is going to use existing stream corridor trees. Hardwood trees with dense branches should be used which will take longer to decay and slow stream flow. Existing material from stream may be used.

Pros:

Economical materials
Create stream habitat

Cons:

Not good for high velocity streams
Trees deteriorate over time
Can be labor intensive
Need anchor trees on existing bank

CRIBWALLS

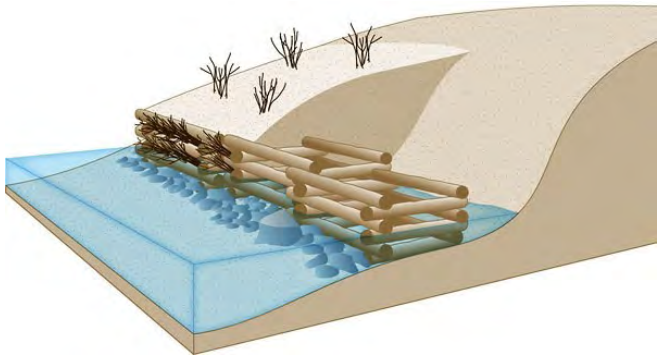
Cribwalls are log structures build into the stream bank wall and filled with soil, stone and vegetation such as willow or dogwood posts.

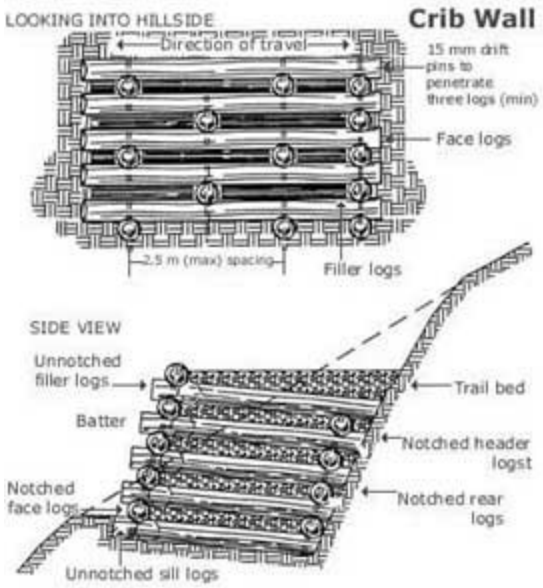
Pros:

Create stream habitat
Steep slopes

Cons:

Not good for undercutting streams
Logs will deteriorate over time
Can be labor intensive
Expensive





IMPORTANCE OF RIPARIAN CORRIDORS

The riparian corridor is a unique plant community consisting of vegetation located adjacent to a stream. Forested corridors maintain many important physical, biological and ecological functions.

- Improve water quality—tree canopies and root systems provide a natural filtration system by filtering excess nutrients from lawns and agriculture.
- Decrease flooding and reduce storm water runoff by storing and gradually releasing rain water over time. A typical medium sized tree can intercept as much as 2,380 gallons of water per year.
- Inhibit the movement of sediment.
- Reduce soil erosion by stabilizing bank with tree roots.
- Provide fish and wildlife habitat—tree canopies cool water and provide an environment for more aquatic species.

Recommended tree species for stream corridors in this area:

- Bald Cypress
- Bur Oak
- Canadian Hemlock
- Eastern Redbud
- Pin Oak
- Red Maple
- Shagbark Hickory
- Silver Maple
- Sugar Maple
- Swamp White Oak
- Sweetgum
- Yellow Poplar

Pleasant Run

INVASIVE VEGETATION CONTROL

ODNR indicates these are the top ten non-native invasive plants in Ohio:

Autumn-Olive	Garlic Mustard	Reed Canary Grass
Multiflora Rose	Japanese Knot Weed	Buckthorns
Bush Honeysuckles	Purple Loosestrife	
Japanese Honeysuckle	Common Reed or Phragmites	

For more information visit ohiodnr.gov/invasiveplants

On stream banks, invasives can outcompete the plants we want that grow and anchor floodplain soils as well as shade streams and encourage quality wildlife habitat. In Fairfield County, we encourage their physical removal or treatment by chemical means, if you are capable. Below are three often found along streams and their floodplain corridors in Fairfield County. Plant images from ohiodnr.gov/invasiveplants.

Amur Honeysuckle - The best control method is to cut and treat stumps with systemic herbicide. Sprouts from cut stems may be treated with a foliar application of systemic herbicide. Young shrubs are easy to pull or dig up. Be aware there is a native bush honeysuckle in Ohio (*Diervilla lonicera*).

Autumn-Olive - Stems may be cut and treated with systemic herbicide. Resprouting will occur, so follow-up control is necessary. A combination of hand-pulling, digging and herbicide treatments is usually necessary.

Garlic Mustard - Light infestations of garlic mustard can be hand pulled before or at flowering time. Plants should be removed from the site after pulling as the seeds may continue to mature. Systemic herbicides can be applied to the rosettes in early spring or late fall.

Remember that only chemicals designated for aquatic use should ever be used along/in the stream to comply with Federal & State Law. Products to consider are Rodeo, Roundup Custom, Garlon 3A or equivalent.

COMMON STREAM MAINTENANCE QUESTIONS

CAN I REMOVE LOGJAMS?

A property owner or a separate entity with the property owner's permission may be able to remove logjams from a stream. Contact the US Army Corps of Engineers to explain your method of removal and inquire about whether a permit is needed. Also contact the Ohio Division of Natural Resources (ODNR) Forester with questions on possible uses of the woody material. Contact the floodplain administrator about where to place removed materials.

CAN I REMOVE FALLEN TREES?

Property owners can remove fallen trees from a river. Removal is highly recommended in cases where the fallen tree lies partially or entirely across the river and blocks flow. This blocked flow can lead to bank and floodplain erosion. If the tree roots are securely anchored in the bank, removing the tree top and leaving the roots will help stabilize the bank. For removal of a few trees, contact a local tree service or arborist. Contact the floodplain administrator about where to place removed materials.

CAN I REMOVE LIVE TREES ALONG THE CREEKS?

Live trees can be removed from along a stream. However, there may be legal restrictions in addition to the wildlife habitat loss and water quality benefit reduction. If the tree and its roots are to be removed, contact the Corps of Engineers. Call the local NRCS office to find out if a wetlands determination must be done. If you are interested in harvesting trees for profit, contact the forester, an informational pamphlet is available. If you are on non-agriculturally zoned land, check with your county or township zoning inspector to determine if any restrictions apply. If you remove a tree from the stream bank, leaving the stump and roots is highly advisable to help protect the bank from erosion.

CAN I REMOVE GRAVEL BARS OR OTHER MATERIAL FROM THE RIVER?

Moving or removing material such as sand or gravel bars from a river may require permitting by the Corps of Engineers and the Ohio EPA. Contact the Corps of Engineers for details on permitting activities in streams. The Ohio Division of Mines and Reclamation must be contacted for a surface mine permit. Contact the Soil and Water Conservation District for technical assistance in assessing the environmental impacts of altering gravel bars.

CAN I PLACE FILL IN THE RIVER?

Placing fill material along a river must be permitted by the Army Corps of Engineers and the Ohio EPA. This activity is also subject to local floodplain and zoning regulations. Contact the Corps of Engineers, your county floodplain administrator, and your township or county zoning inspector for details.

CAN I STABILIZE THE RIVER BANK?

Resource professionals should evaluate bank erosion areas before any type of stabilization practice is attempted. If stabilization is determined to be possible for a site, the stabilization method will dictate what types of approvals are needed. The county floodplain administrator must approve every type of project, and some projects may need Corps of Engineers and Ohio EPA approval and possible permits.

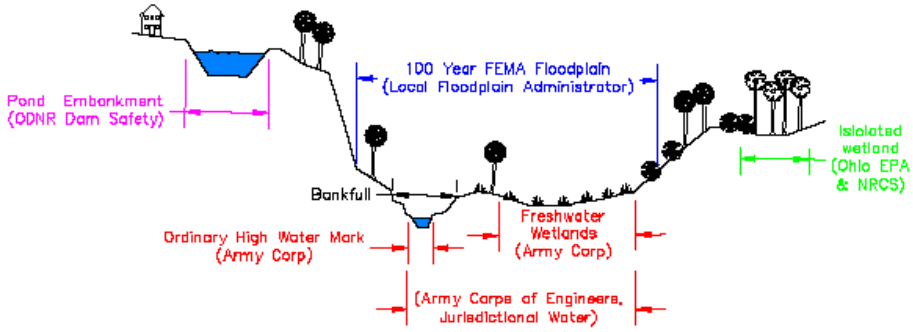
CAN I CONSTRUCT A PERMANENT CREEK FORD (shallow crossing)?

A permanent creek ford must be permitted by the Corps of Engineers and Ohio EPA. Contact the Corps of Engineers for details on what type of permitting is required. The construction method and permanent alteration of the channel may have an adverse impact on the creek. This activity would also be subject to any local floodplain and zoning regulations. There are agricultural exceptions, contact the Fairfield Soil and Water Conservation District or NRCS office at 740-653-8154.

What Permit Where?

Contacts for Fairfield County

Floodplain Administrator	
(County non–incorporated limits)	
Fairfield County Regional Planning	(740) 652-7110
(City or Village-incorporated limits)	See local directory
City of Lancaster	(740) 687-6614
City of Pickerington	(614) 833-2221
Village of Baltimore	(740) 862-4491
Village of Bremen	(740) 569-4788
Village of Buckeye Lake	(740) 918-7100
Village of Canal Winchester	(740) 837-7501
Village of Millersport	(740) 467-2333
Village of Sugar Grove	(740) 746-8406
Violet Township	(614) 382-5973
ODNR - Floodplain Administrator	(614) 265-6750
ODNR - Division of Dam Safety	(614) 265-6731
Natural Resources Conservation Service	(740) 653-5320
Ohio EPA, Division of Surface Water, 401 Unit	(614) 644-2001
US Army Corps of Engineers, Huntington District	(304) 399-5210



Army Corps of Engineers and Ohio Environmental Protection Agency Permits

Stream bank stabilization may be covered under the nationwide permit number 13. In general Nationwide 13 applies if:

a) No material is placed in excess of the minimum needed for erosion protection.
b) The activity is no more than 500 feet in length along the bank, unless this criterion is waived in writing by the Army Corp district engineer.
c) The activity will not exceed an average of one cubic yard per running foot placed along the bank below the plan of the ordinary high water mark of the high tide line, unless this criterion is waived in writing by the Army Corp district engineer.
d) The activity does not involve discharges of dredged or fill material into special aquatic sites, unless this criterion is waived in writing by the Army Corp district engineer.
e) No material is of the type, or is placed in any location, or in any manner, to impair surface water flow into or out of any water of the United States.
f) No material is placed in a manner that will be eroded by normal or expected high flows (properly anchored trees and treetops may be used in low energy areas).
g) The activity is not a stream channelization activity.

Call the Army Corps to see if your situation falls under this permit. If your project requires you to do one or more of the above, an individual permit from the Army Corps will be required. Ohio EPA has concerns depending on the type of stream (warm water habitat, etc.) and the amount of stream disturbance. An OEPA permit may be needed even if your project falls under Army Corps Nationwide 13 Permit.

FAIRFIELD SOIL & WATER CONSERVATION DISTRICT

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Achieving workable natural resource solutions in Fairfield County since 1943

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